REMARKS

Claim 14 has been canceled, and claim 15 has been amended so that it is in independent form. Claims 16-19 have been amended so that they depend from claim 15.

Entry of the above amendment is respectfully requested.

Obviousness Rejections

Claims 14, 15, and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Kikuchi (JP 2001-348786) in view of Takebe et al. (U.S. Patent 6,096,380), Hanada et al. (U.S. Patent 4,853,418), Retzsch (U.S. Patent 4,018,559), or Sagiv et al. (U.S. Patent Application Publication 2002/0002232). Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi and Takebe, Hanada, Retzsch, or Sagiv as applied to claims 14, 15, and 17-19, and further in view of Sato et al. (JP 63249787).

Applicants respectfully submit that the present invention is not obvious over the cited art, and request that the Examiner reconsider and withdraw these rejections in view of the following remarks.

(1) Kikuchi (JP 2001-348786)

(i) Liquids (A) and (B) on both surfaces

The Examiner says that Kikuchi discloses that a treatment liquid (A) is applied to the surface of substrate and a treatment (B) applied to the surface of film layer. However, Applicants submit that this understanding is not correct.

The examiner's understanding seems to be based on the machine translation of paragraph 0028 made by the JPO and INPIT, a copy of which is attached. The translated sentence is

"[0028] Next, a polymer elastomer (2) water dispersion used as a glue line is applied on an epidermis layer **and** a fiber composite sheet." (emphasis added).

However, this machine translation is apparently a mistranslation. Kikuchi discloses that a polymeric elastomer (2) water dispersion is coated **either** on the surface layer (corresponds to the film layer) **or** a fiber composite sheet (corresponds to the fibrous substrate). That is, a polymeric elastomer (2) water dispersion is coated on the fibrous substrate **or** on the film layer.

In this regard, Applicants filed a partial translation of Kikuchi in an Information Disclosure Statement on February 23, 2009. A copy of the partial translation is attached hereto for the Examiner's convenience. The partial translation clearly describes "Then, the high-molecular-weight elastomer (2) aqueous dispersion to form an adhesive layer is applied onto the skin layer **or** the fiber composite sheet" (emphasis added). Kikuchi discloses that a polymeric elastomer (2) water dispersion is coated either on the substrate or on the skin layer. This fact is supported by every one of the examples of Kikuchi that an adhesive layer is applied onto the surface of a film layer only.

Further, according to the description of Kikuchi, it is understood that a person skilled in the art would have avoided the method of applying adhesive onto both surfaces, since such a process requires an additional step.

(ii) Solvent and water

In the conventional method, a treatment liquid containing solvent has been used as a treatment liquid for a production of a leather-like sheet material. In the case of using treatment liquids containing solvent, the merit of applying the treatment liquids on both surfaces of substrate and film layer is not achieved, since the components in the treatment liquid are mixed together by the effect of solvents, when both surfaces are attached.

In contrast to this, the mixing of components does not occur in the present invention, since the present invention uses a water based solution.

The present invention is characterized in that a treatment liquid (A) is applied on a substrate and a treatment liquid (B) is applied on a film layer. This unique method is not disclosed in Kikuchi or other cited documents.

(2) Other documents

Takebe (US 6,096,380), Hanada (USP 4,853,418), Retzsch (USP 4,018,559) and Sagiv (US 2002/2232) are silent about a water-based adhesive layer containing a silicone compound. These documents only disclose conventional silicone compounds.

Naturally, these documents are silent about the unique method of applying a treatment liquid (A) on a substrate and applying a treatment liquid (B) on a film layer.

The present invention is different from these cited references in the following point that the elastic polymer is water-based and not solvent-based, the layer containing silicone is an adhesive layer and not a surface layer, and the adhesive layer infiltrates into the fibrous substrate.

(3) Technical merit

The present invention has the following merit by using a unique method of applying a treatment liquid (A) containing silicone on a substrate and applying a treatment liquid (B) on a film layer.

That is, the treatment liquid infiltrates into the fibrous substrate. According to this infiltrating effect, the present invention provide a leather-like sheet material having improved abrasion resistance and excellent tenacity against peeling and flexibility (see page 2, lines 31-34 and Examples 7-10 in the present application).

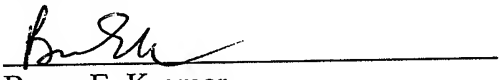
Therefore, Applicants submit that the present invention is not obvious over Kikuchi in view of other documents, and withdrawal of these rejections is respectfully requested.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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2011.2.14. JPO and INPIT the machine translation

JP,2001-348786,A

* NOTICES *

JPO and INPIT are not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[0028]Next, a polymeric elastomer (2) water dispersion used as a glue line is applied on an epidermis layer and a fiber composite sheet. Since subduction will set and a sheet will become hard at this time if it applies on a fiber composite sheet when [with many moisture contents of a water dispersion] viscosity is low, applying on an epidermis layer is preferred. Predrying may be performed, in order to paste together soon and to adjust water content of a polymeric elastomer (2), after applying.

(The Partial English translation of Japanese Laid-open Patent Publication No. 2001-348786)

(19) Japanese Patent Office (JP)
(11) Laid-open patent publication No. 2001-348786
(43) Laid-open publication date: December 21, 2001
(54) Title of the Invention: Leather-like sheet and process for producing thereof
(21) Japanese Patent Application No. 2000-164534
(22) Filing date: June 1, 2000
(72) Inventors: Masayoshi KIKUCHI, et al
(71) Applicant: Teijin Limited

[Claims]

[Claim 1] A leather-like sheet formed by laminating a skin layer formed of a high-molecular-weight elastomer (3) on the surface of a fiber composite sheet formed of a fiber aggregate and a high-molecular-weight elastomer (1) through an adhesive layer formed from a high-molecular-weight elastomer (2) aqueous dispersion, characterized in that the peel strength (A) thereof in a dry state satisfies 20 N/cm $\leqq$ (A) $\leqq$ 50 N/cm, that the peel strength in a wet state satisfies 0.5 x (A) $\leqq$ (B) $\leqq$ (A), that the leather-like index (C) obtained by dividing a flexural compressive stress with a flexural hardness satisfies 25 $\leqq$ (C) $\leqq$ 100, and that the content (D) of an organic solvent based on the total weight of the leather-like sheet is 0 wt% $\leqq$ (D) $\leqq$ 0.05 wt%.

[Claim 2] The leather-like sheet of claim 1, wherein a conversion diameter of a maximum space in said adhesive layer is 100 μm or less.

[Claim 3] The leather-like sheet of claim 1 or 2, which exhibits at least grade 4 in a bending fatigue test that is carried out at 200,000 times.

[Claim 4] The leather-like sheet of any one of claims 1 to 3, wherein the high-molecular-weight elastomer (2) of said adhesive layer is crosslinked.

[Claim 5] The leather-like sheet of any one of claims 1 to 4, wherein the high-molecular-weight elastomer (1) is a water-dispersible polyurethane resin.

[Claim 6] The leather-like sheet of any one of claims 1 to 5, wherein a fiber constituting said fiber aggregate is at least one fiber selected from the group consisting of a polyester fiber and a polyamide fiber.

[Claim 7] The leather-like sheet of any one of claims 1 to 6, wherein a fiber constituting said fiber aggregate has a monofilament fineness of 0.001 dtex or more but 1.0 dtex or less.

[Claim 8] The leather-like sheet of any one of claims 1 to 7, wherein said fiber composite sheet is formed of said fiber aggregate having an apparent density of 0.3 to 0.6 g/cm^3 that is attained by shrinking a constituting fiber having the property of being shrinkable before it is impregnated with said high-molecular-weight elastomer (1) and said high-molecular-weight elastomer (1).

[Claim 9] The leather-like sheet of any one of claims 1 to 8, wherein the high-molecular-weight elastomer (2) of said adhesive layer is a polyurethane resin.

[Claim 10] A process for producing a leather-like sheet, which comprises attaching a skin layer formed of a high-molecular-weight elastomer (3) and a fiber composite sheet formed of a fiber aggregate and a high-molecular-weight elastomer (1) to each other with a high-molecular-weight elastomer (2) aqueous dispersion to form a laminate, then heating said laminate at 100 to 180°C for 10 seconds or more but 5 minutes or less, and further nipping it with heat rolls at 100 to 180°C.

[Claim 11] A process for producing a leather-like sheet, which comprises attaching a skin layer formed of a high-molecular-weight elastomer (3) and a fiber composite sheet formed of a fiber aggregate and a high-molecular-weight

elastomer (1) to each other with a high-molecular-weight elastomer (2) aqueous dispersion to form a laminate, then nipping said laminate it with heat rolls at 100 to 180°C, and further heating the laminate at 100 to 180°C for 30 seconds or more while the thickness of said laminate is maintained at a thickness that the laminate had before nipped or less.

[Claim 12] The process for producing a leather-like sheet as recited in claim 10 or 11, wherein the high-molecular-weight elastomer (2) aqueous dispersion is applied onto the skin layer, the water content of said dispersion is adjusted to 3 to 70 %, and then the skin layer and the fiber composite sheet are attached to each other to form the laminate.

[0028] Then, the high-molecular-weight elastomer (2) aqueous dispersion to form an adhesive layer is applied onto the skin layer or the fiber composite sheet. In this case, when the aqueous dispersion has a large water content and a low viscosity, it sinks in the fiber composite sheet when applied onto the fiber composite sheet, and the sheet is hardened. It is hence preferred to apply it onto the skin layer. After it is applied, they may be bonded to each other, or preliminary drying may be carried out for adjusting the water content of the high-molecular-weight elastomer (2).

[0030] When the preliminary drying of the adhesive layer is carried out, it is preferred to dry it at a temperature of 30°C to lower than 100°C, more preferably at a temperature of 60°C or higher but 90°C or lower. When the drying is carried out at a temperature lower than 30°C, the drying tends to need a step that takes a long period of time. When the drying is carried out at a temperature higher than 100°C, water evaporates rapidly to crack the adhesive layer, or when a crosslinking agent is used, a crosslinking reaction proceeds before the skin layer is attached to the fiber composite sheet, and the bonding strength and the water resistance tend to decrease.

[0032] Thereafter, in one method, for example, the above laminate is pre-heated at 100 to 180°C for 10 seconds or more but 5 minutes or less, more preferably for 15 seconds or more but 2 minutes or less, and nipped with heat rolls at 100 to 180°C, more preferably 110°C to 140°C.

[0040] In the leather-like sheet of this invention, the high-molecular-weight elastomer dispersion is used as an adhesive layer thereby to ensure that the content (D) of the organic solvent based on the total weight of the leather-like sheet is 0 wt% $\leqq$ (D) $\leqq$ 0.05 wt%. Further, as the high-molecular-weight elastomers (1) and (3), aqueous elastomers are employed, whereby the content of remaining organic solvents in the entire leather-like sheet can be decreased.

[0062] [Example 1] A prepared liquid for a film layer was applied onto a release paper (AR-144SM, thickness 0.25 mm, supplied by ASAHI ROLL CO., LTD.) to form a coating having a thickness of 100 μm (wet), the prepared liquid having a composition of HYDRAN WLS211 (aqueous polyurethane resin, supplied by DIC CORPORATION, solid content 35 % by weight)/DISPERSE HG (water-dispersible black pigment, supplied by DIC CORPORATION)/HYDRAN WL Assister T1 (urethane-containing thickener, supplied by DIC CORPORATION)/HYDRAN Assister C2 (isocyanate-containing crosslinker, supplied by DIC CORPORATION)/ HYDRAN WL Assister W1 (leveling agent, supplied by DIC CORPORATION)/ HYDRAN Assister D1 (anti-foaming agent, supplied by DIC CORPORATION) in a ratio of 100/5/0.25/4/0.2/5 (parts by weight). The applied coating was dried in two stages, firstly at 70°C for 2 minutes and secondly at 110°C for 4 minutes, to form a polyurethane resin film (to be referred to as "film layer" hereinafter).

[0063] Further, a prepared adhesive liquid was applied onto the surface thereof to form a coating having a thickness of 150 μm (wet), the prepared adhesive liquid having a composition of HYDRAN WLA3211 (aqueous polyurethane resin,

supplied by DIC CORPORATION, solid content 45 % by weight)/ DISPERSE HG (water-dispersible black pigment, supplied by DIC CORPORATION)/ HYDRAN WL Assister T1 (urethane-containing thickener, supplied by DIC CORPORATION)/ HYDRAN WL Assister C2 (isocyanate-containing crosslinker, supplied by DIC CORPORATION) in a ratio of 100/5/0.1/10 (part). The applied liquid on the release paper was measured for a water content to show 45.8 %.

[0064] Immediately after the application, the thus-obtained adhesive layer was attached to a fiber composite sheet 1, the resultant set was brought into contact with a heat cylinder (surface temperature 130°C) to apply pre-heating for 15 seconds, and then it was thermally nipped with the above cylinder under the condition of a 1.0 mm clearance. Further, it was cured at 20°C for 2 minutes. After it was cured, a base material had a water content of 4.1 %. Further, it was aged at 50°C for 24 hours, and the release paper was peeled off to give a silver-toned artificial leather-like sheet.

[0065] The above sheet had a skin layer thickness of 95 μm, had a peel strength of 23 N/cm in a dry state, a peel strength of 21 N/cm in a wet state, a leather likeliness of 75 and a flexing test result of grade 4. Further, the thus-obtained leather-like sheet was measured for organic solvent contents to show a measurable limit or less with regard to any organic solvent.

[0066] [Example 2] In the same manner as in Example 1, a film layer was formed on a release paper by using the same prepared liquid, and the same prepared adhesive liquid was applied onto the surface thereof to form a coating having a thickness of 150 μm (wet). The applied liquid on the release paper was measured for a water content to show 45.8 %. Immediately after the application, the adhesive layer was attached to a fiber composite sheet 1, the resultant set was brought into contact with a heat cylinder (surface temperature 130°C) to apply pre-heating for 30 seconds, and then it was thermally nipped with the above

cylinder under the condition of a 1.0 mm clearance. Further, it was cured at 20°C for 2 minutes. After it was cured, a base material had a water content of 2.2 %. Further, it was aged at 50°C for 24 hours, and the release paper was peeled off to give a silver-toned artificial leather-like sheet.

[0067] The above sheet had a skin layer thickness of 86 μm, had a peel strength of 24 N/cm in a dry state, a peel strength of 22 N/cm in a wet state, a leather likeliness of 78 and a flexing test result of grade 4. Further, the thus-obtained leather-like sheet was measured for organic solvent contents to show a measurable limit or less with regard to any organic solvent.

[0068] [Example 3] In the same manner as in Example 1, a film layer was formed on a release paper by using the same prepared liquid, and the same prepared adhesive liquid was applied onto the surface thereof to form a coating having a thickness of 150 μm (wet). After the application, the coating on the release paper was preliminary-dried at 70°C for 2 minutes. In this case, the applied liquid on the release paper was measured for a water content to show 12.2 %. After the preliminary drying, the adhesive layer was attached to a fiber composite sheet 1, the resultant set was thermally nipped with a heat cylinder (surface temperature 130°C) under the condition of a 1.0 mm clearance, and post-heating was applied for 30 seconds while it was on the above cylinder. Further, it was cured at 120°C for 2 minutes. After it was cured, a base material had a water content of 1.9 %. Further, it was aged at 50°C for 24 hours, and the release paper was peeled off to give a silver-toned artificial leather-like sheet 3.

[0069] The above sheet had a skin layer thickness of 95 μm, had a peel strength of 21 N/cm in a dry state, a peel strength of 21 N/cm in a wet state, a leather likeliness of 62 and a flexing test result of grade 3.

[0070] [Example 4] In the same manner as in Example 1, a

film layer was formed on a release paper by using the same prepared liquid, and the same prepared adhesive liquid was applied onto the surface thereof to form a coating having a thickness of 150 μm (wet). After the application, the coating on the release paper was preliminary-dried at 70°C for 2 minutes. In this case, the applied liquid on the release paper was measured for a water content to show 12.3 %. After the preliminary drying, the adhesive layer was attached to a fiber composite sheet 1, the resultant set was thermally nipped with a heat cylinder (surface temperature 130°C) under the condition of a 100 N/cm linear pressure, and thereafter, post-heating was applied for 30 seconds while it was on the above cylinder. Further, it was cured at 120°C for 2 minutes. After it was cured, a base material had a water content of 1.2 %. Further, it was aged at 50°C for 24 hours, and the release paper was peeled off to give a silver-toned artificial leather-like sheet.

[0071] The above sheet had a skin layer thickness of 84 μm, had a peel strength of 30 N/cm in a dry state, a peel strength of 26 N/cm in a wet state, a leather likeliness of 70 and a flexing test result of grade 4.